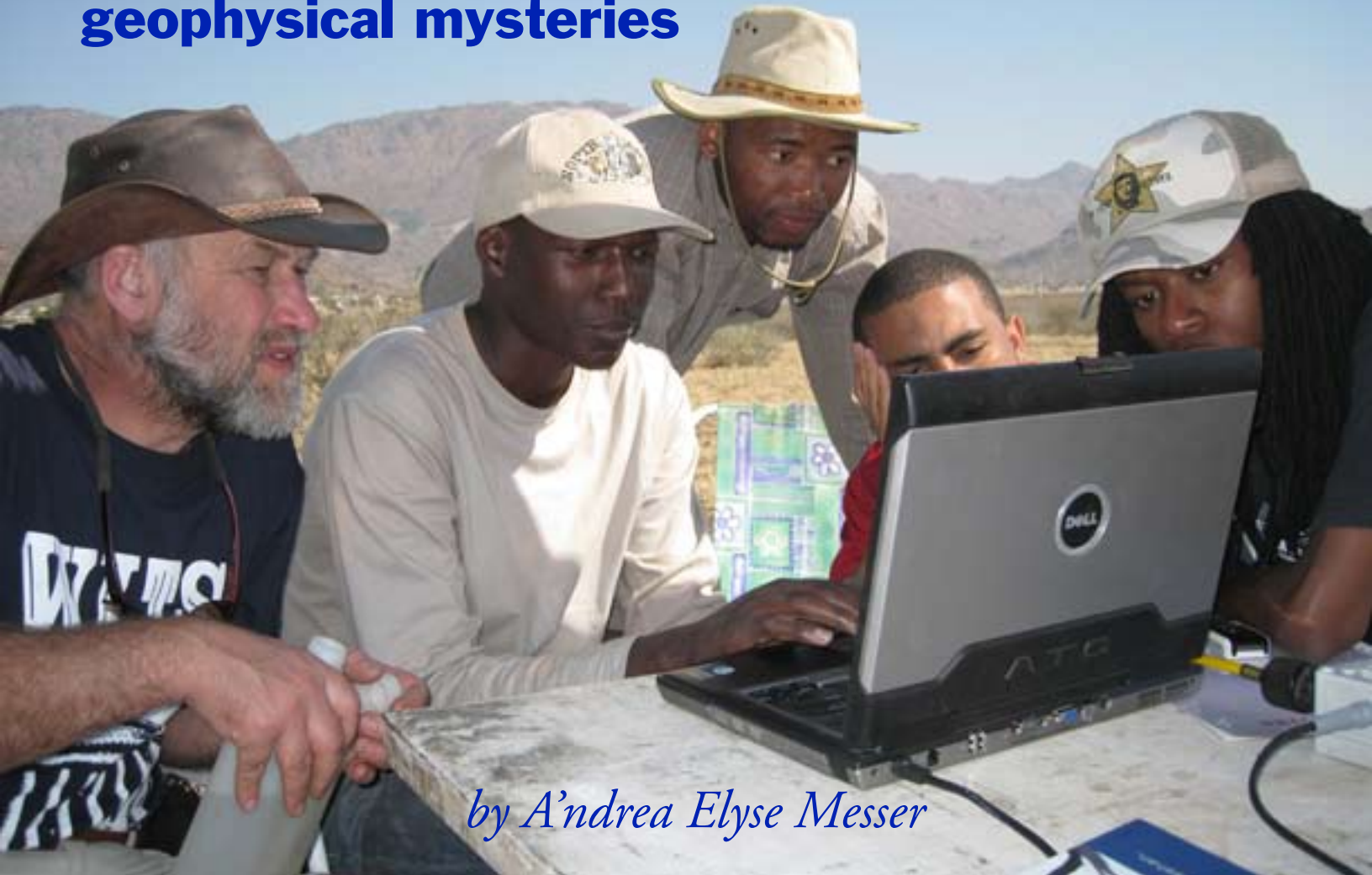


# African initiative trains students, explores geophysical mysteries



*by A'ndrea Elyse Messer*

Earthquakes, volcanoes and the African superplume are only some of the phenomena under investigation through AfricaArray, a program that establishes geophysical observatories, trains African and American students and examines geophysical phenomena on the African continent.

“In order to train masters and doctoral students there has to be a research effort,” said Andrew Nyblade, professor of geosciences, Penn State and co-director of AfricaArray. “We started with geophysics but we think it is a good model to support all geoscience,” he told attendees at the annual meeting of the American Association for the Advancement of Science on Feb. 13 in Chicago.

The model, created by a trio of institutions — Penn State; University of the Witwatersrand, Johannesburg, S.A., and the Council for Geoscience (S.A.) — combines student education with establishment of a research program in geophysics; field schools attended by African and American students and corporate personnel, and a graduate exchange program.

The center of the program is the research that relies on data from a network of seismic observatories: 27 installed by AfricaArray, 6 that should be installed by the end of the year and 16 other seismic observatories. The program also employs temporary targeted networks of stations for specific, higher resolution problems and currently has networks in Angola,

Botswana and Namibia exploring the Congo Craton; South African gold mines looking at small, deep seismic events, and in Uganda/Tanzania for imaging the African Superplume. Data from the stations is stored with the Incorporated Research Institutions for Seismology (IRIS), a university research consortium sponsored by the National Science Foundation.

“Africa has not really been looked at in this way by geologists,” said Nyblade. “Underneath South Africa and its surrounding ocean sits the largest seismic anomaly in the Earth’s mantle. We call it the African Superplume, but

*Above photo: Ray Durrheim and students examining seismic refraction data in the field.*

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*Above photo: Students examining GPS coordinates in the field.*

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we do not really know what it is because we do not have very good images of it.”

He notes that another superplume exists in the middle of the Pacific Ocean exactly opposite the African superplume and slightly smaller. Investigating the African superplume is easier. Scientists understand the down welling that takes place at subduction zones, areas in the Earth where one tectonic plate moves beneath another and dips down into the mantle. However, scientists do not understand up welling, which is perhaps what forms the superplumes.

“We do not really know what it is or why it is or how it fits into plate tectonics,” says Nyblade. “It could be a key to understanding how our planet works internally. If we record enough data we can help to explain and image the mantle under Africa.”

Nyblade works with Paul Dirks, head of the School of Geosciences at Witwatersrand who he met for the first time in 2003 at that first meeting

of Penn State AESEDA — Alliance for Earth Sciences, Engineering and Development in Africa. Although an independent project, AESEDA now is a partner in AfricaArray. So far, after three years, AfricaArray has supported 34 undergraduate, 13 masters and 10 doctoral students. They have also hosted five postdoctoral fellows. From the U.S. side, 12 students, half of them women, have participated in three-week geophysical summer programs to South Africa from North Carolina A&T State University; Fort Valley State University, Georgia; University of Texas, El Paso, and California State University, Northridge. Graduate students from Wits have also come to the U.S. to study under Penn State faculty co-advisors.

“We decided that if we could do this at Wits, we should be able to do it at other universities in Africa,” said Nyblade. “And, if we are going to do this so that we can focus on students with disadvantaged backgrounds, women across Africa are in that category.”

Plans for the future include expansion of seismic observatories into West Africa

and eventually North Africa as well. They are currently working with two other African universities — Agostinho Neto in Angola and Addis Ababa University in Ethiopia — to include the program in their universities. The researchers would like to see installation of additional types of sensors and monitors including meteorological, environmental and geographic positioning system instruments, noting that once the infrastructure is there for the seismic observations, it is easier to collect data in other disciplines.

Other researchers involved in this project include Ray Durrheim and Sue Webb, University of the Witwatersrand and Gerhard Graham, Council for Geosciences. AfricaArray is a public private partnership supporting geoscience training and research in Africa. The sponsors of this program can be found at [http://africaarray.psu.edu/partners/current\\_partners.asp](http://africaarray.psu.edu/partners/current_partners.asp). ■



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*For more information about AfricaArray please visit the website at [www.africaarray.psu.edu](http://www.africaarray.psu.edu).*